III. NOTES ON ORDOVICIAN TRILOBITES. II.

Asaphidæ from the Beekmantown.

By Percy E. Raymond.

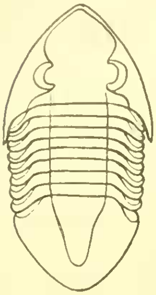
Asaphids first become prominent in American faunas in the Beekmantown, but few species have been described from that formation, it being the usual custom to refer any smooth-tailed species to *Asaphus canalis*. A closer study of some of the material shows that the hypostoma of two of the Beekmantown Asaphids is not forked, so that they can not belong to the same genus as *Asaphus canalis* Whitfield, nor even to the same section of the family. As for the *Asaphus canalis* of Whitfield, the writer will attempt to show that it is more nearly related to *Isotelus* than to *Asaphus*, but that it can not be placed in either genus.

Family ASAPHIDÆ Emmrich.

Isoteloides Genus nov.

This genus is proposed to include *Asaphidæ* with forked hypostoma, long and narrow form, narrow axial lobe, feebly outlined glabella which does not reach front of cephalon, glabellar furrows faint or absent, neck furrow nearly obsolete, and a small median tubercle present on the glabella. Pygidium with prominent, narrow axial lobe, but with slight traces of segmentation Flattened border present on pygidium and front of cephalon. Type, *Asaphus canalis* Whitfield.

This genus is separated from *Asaphus* because the glabella does not reach to the front of the cephalon, nor does it expand toward the front, because of the almost obsolete neck and dorsal furrows, the long and narrow form, and the presence of a flattened border on cephalon and pygidium. It agrees with *Asaphus* in the form of the hypostoma, which has the wings separated from the convex body by deep grooves. It also agrees with *Asaphus* in possessing a narrow axial lobe, a defined glabella, and a median pustule on the posterior portion of the glabella. These are, however, characters common to several genera among the *Asaphidæ*. The most important characteristics of the typical *Asaphus* seem to be the short and wide form of the cephalon and pygidium, the absence of a depressed border at either extremity, the fact that the glabella expands toward the front and reaches the anterior margin, the form of the hypostoma, and the absence of spines at the genal angles. In all these points (except in the form of the hypostoma) *Isoteloides* is unlike *Asaphus*.



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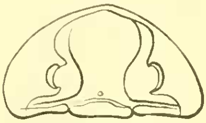

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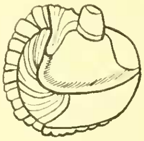

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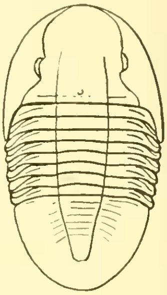

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Fig. 1. *Isotelus gigas* Dekay. Outline drawing of young specimen, for comparison with fig. 4.

Fig. 2. *Asaphus expansus* (Linné). Compare proportions of cephalon and shape of glabella with 1 and 4.

Fig. 3. *Asaphus expansus* (Linné). Side view of an enrolled specimen. Notice the lack of a concave border round the cephalon and pygidium. 2 and 3 after Salter.

Fig. 4. *Isoteloides whitfieldi* Raymond. Outline drawing of a specimen in the Carnegie Museum.

Isoteloides agrees with *Isotelus* in having the dorsal furrows and neck ring very faint on the cephalon, in the almost entire absence of segmentation on the pygidium, in having a depressed border on the pygidium, and in the presence of spines at the genal angles. It differs from *Isotelus* in the form of the hypostoma, in having a defined glabella and a median tubercle, and in having a narrow axial lobe.

Isotelus angusticaudus Raymond of the Chazy and *Asaphus homalnotoides* Walcott of the Black River and Trenton appear to belong to this genus.

Isoteloides whitfieldi nomen nov.

Plate XIV, figures 1–4.

Asaphus canalis Whitfield, Bulletin American Museum Natural History, I, 1886, 336, pl. 34, figs. 1–8. (not of Conrad or Hall).—Whitfield, Bulletin American Museum Natural History, II, 1889, 64, pls. 11, 12.

Not *Asaphus* or *Isotelus canalis* of Conrad, Hall, Billings, Clarke, Cleland, or Weller.

The first mention of the specific name *canalis* as applied to an Asaphid was by Hall in the "Paleontology of New York," Vol. I, p. 25. Hall credits the name to Conrad, in manuscript, and describes and figures the hypostoma and doublure of a large trilobite. These fragments and the brief description do not serve to define a species. The specimens were from the upper part of the Chazy a little west of Chazy village, New York. From what is now known of the *Asaphidæ* of the Chazy it seems most probable that these fragments belong to what is now known as *Isotelus harrisi* Raymond. As this can not be determined, the name *Asaphus canalis* has no meaning. The species described by Whitfield, coming as it does from a much lower horizon, can not by any possibility be the species of which Hall had fragments, and the name *canalis* should not be applied to it. I therefore propose to name it for the late Professor R. P. Whitfield, to whom we owe a full and accurate description of the species.

Genus ASAPHELLUS Callaway.

Asaphellus Callaway, Quarterly Journal Geological Society London, XXXIII, 1877, 663.

This name was proposed by Callaway for *Asaphus homfrayi* Salter, chiefly on account of the entire hypostoma. It has been considered by Brogger and Schmidt as a subgenus of *Niobe*, and is indeed very similar to that genus, but differs fundamentally in the course of the suture in front of the eye In *Asaphellus* the course of the suture is entirely on the dorsal surface of the cephalon and the two sutures meet in a point in the middle of the anterior margin as in *Asaphus* and *Isotelus*. For the sake of brevity this will be referred to hereafter as the *Isoteliform* suture. In *Niobe* the suture cuts the anterior margin in front of the eye, and follows around the frontal margin as in *Nileus*. This will be called the *Niobiform* suture. Among the *Asaphidæ* with forked hypostomas the *Isoteliform* suture prevails, *Asaphus*. *Onchometopus*, *Ptychopyge*, *Isoteloides*, and *Iso-*

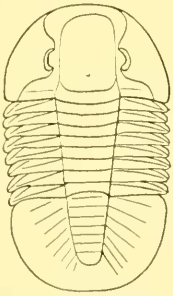
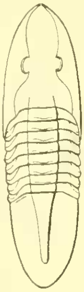


FIG. 5. *Niobe insignis* Linnarsson. Outline to show course of facial suture. Thorax supplied. Cephalon and pygidium after Brogger.

telus all having this type, while *Basilicus* is the only member of the group with the *Niobiform* suture. On the other hand those trilobites with an undivided hypostoma usually have the *Niobiform* suture, it being present in *Ogygia, Ptychocheilus, Asaphelina, Niobe, Symphysurus, Illænurus. Nileus, Barrandia, Homalopteon,* and *Platypeltis* A few genera which have the undivided hypostoma do have the *Isoteliform* suture, namely, *Megalaspis, Megalaspides, Asaphellus* (as here restricted) and *Ogygia corndensis,* a species which Salter and Brogger have both said was not an *Ogygia,* but which they could not refer to any existing genus. Taking into consideration these facts, it does not seem possible to place *Asaphellus* as a subgenus of *Niobe,* or to place in one subgenus species having both types of suture, as Brogger has done in emending *Asaphellus* so as to include *Asaphus affinis* McCoy, *Ogygia desiderata* Barrande, and other species which are here referred to a new subgenus of *Niobe*.[1]



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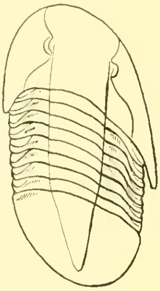

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FIG. 6. *Asaphellus homfrayi* (Salter). Outline of compressed specimen. After Salter.

FIG. 7. *Hemigyraspis affinis* (McCoy). Outline of a somewhat distorted specimen. After Salter.

The genus *Asaphellus* is here restricted to trilobites having the same characteristics as the type species, *Asaphus homfrayi* Salter. The facial suture is entirely on the dorsal surface as in *Isotelus*, the glabella is smooth and hardly defined, also as in *Isotelus*, but there is a median pustule on the glabella, the hypostoma is not forked, and the thorax has a narrow axial lobe. There is no neck ring, the neck furrow is extremely shallow, and the spines at the genal angles are long and nearly circular in cross

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[1] "Ueber die Ausbildung des Hypostomes bei einigen Skandinavischen Asaphiden," *Bihang till K. Svenska Vet. Akad. Handlingar*, Band XI, 1886, p. 55. Also his article on the "Euloma-Niobe Fauna," *Nyt Mag. for Naturvidensk*, Band XXXV, 1896.

section The pygidium is nearly smooth, the axial lobe being only faintly defined, and nearly all traces of segmentation lost.

Beside the type species, the genus as restricted will include *Asaphellus homfrayi* Matthew var. from the Tremadoc of Cape Breton, and the two new species here described.

Asaphellus gyracanthus sp. nov.

Plate XIV, figures 5–7.

Asaphus canalis? CLELAND, Bulletin American Paleontology, III, 1900, 128, pl. 16, figs. 7, 8.—CLELAND, Bulletin American Paleontology, IV, 1903, 38.

Isotelus canalis WELLER, Paleontology New Jersey, III, 1902, p. 132, pl. 5, figs. 5, 6.

This asaphid is very abundant in the Beekmantown at Fort Hunter, New York, but no complete specimens have been found. From the general shape of the pygidia and free cheeks Cleland concluded that the trilobite was probably *Asaphus canalis*, but the discovery of an unforked hypostoma of the *Asaphellus* type associated with the specimens shows that it belongs to another section of the family.

Only one fairly complete cranidium, that mentioned by Cleland, seems to have been found. Through the kindness of Professor Harris I have been able to see this specimen. There are hardly any traces of dorsal furrows, so that the glabella is as flat as in *Isotelus*. In front of the glabella is a narrow depressed border. While there are no entire cephala known, the shape of the anterior end of the cranidium is such as to indicate that the facial sutures met in a point on the margin and that the whole course of the suture is on the dorsal surface. The eyes are not so far forward as in *Hemigyraspis collieana* and are closer together. Between them is a minute pustule. The free cheeks are broad, flat and bear long spines at the genal angles. The pygidium is semicircular in outline, evenly convex with a narrow depressed border. The axial lobe is not prominent, but there are traces of three or four rings at the anterior end. The hypostoma, of which there is a single specimen in the Carnegie Museum, is similar to that of *Hemigyraspis collieana*, a figure of which is given on the plate.

The pygidium of this species differs from that of *Isoteloides whitfieldi* in having the axial lobe much less clearly outlined and in being shorter in proportion to the width, as well as in the general contour, the whole surface being evenly convex in the specimens of *Asaphellus gyracanthus*, while in *Isoteloides whitfieldi* the axial and pleural lobes are prominent.

The pygidia resemble more closely those of *Hemigyraspis collieana*, but are a little longer in proportion to the width, and have a less prominent axial lobe. The genal spines are very unlike those of *Isoteloides whitfieldi*, being circular in section and very long.

It appears from Weller's figures that this same species occurs in New Jersey.

Asaphellus monticola sp nov.

Plate XIV, figure 8.

In a collection of fossils recently acquired by the Carnegie Museum there is a nearly complete specimen of an *Asaphellus* collected by Monsieur Jean Miquel at the Montagne Noire, Herault, France. It is such an excellent example of the genus as restricted, that I can not refrain from describing it.

The form is long and narrow, the cranidium flat, the glabella not outlined, the dorsal furrows not present on the cephalon except as depressions on the posterior margin. The eyes are small, situated one-third the length of the head from the posterior margin. There is a very shallow neck-furrow, but no neck-ring, and there is a small median pustule on the posterior portion of the glabella.

The thorax has eight segments, the axial lobe is one-third the total width, and the pleura are deeply grooved. The pygidium is subtriangular with a narrow concave border, the axial lobe is only faintly defined, and there are scarcely any traces of segmentation.

The total length of the specimen is 47 mm.; the width at the middle of the thorax 23 mm. The cranidium is 18 mm. long; the pygidium 16 mm. long and 23 mm. wide.

This species differs from *Asaphellus homfrayi* Salter chiefly in the pygidium, which is narrower and has a much narrower concave border. Our specimen is not distorted, but the form is much more like the compressed specimen figured by Salter ("British Trilobites," Pl. 24, fig. 6) than like any of the other specimens figured. The French specimen is much narrower than the *Asaphellus homfrayi* var. figured by Matthew.

There is another species associated with this at the Montagne Noire with a smooth cranidium, and which might be confused with the one here described. This second species has, however, a short and wide cephalon and pygidium, and the facial suture is of the *Niobe* type. It is probably *Hemigyraspis desiderata* (Barrande).

Locality.—The specimen here described was collected at Le Priou, near

Pierrerue and L'Chinian, Herault, France, by Monsieur Jean Miquel. The horizon was in the middle of the Tremadoc. The holotype is in the Carnegie Museum.

Genus NIOBE Angelin.

Subgenus **Hemigyraspis** nov.

This subgenus is proposed for *Asaphidæ* with entire hypostoma, smooth, undefined glabella which does not reach to the anterior margin, no glabellar furrows and no neck-ring, facial sutures whose anterior limbs cut the frontal margin in front of the eye (Niobiform), thorax with narrow axial lobe, pygidium semicircular and nearly ribless. Type, *Asaphus affinis* McCoy, as described by Salter, "Monograph British Silurian Trilobites," Pl. XXIV, figs. 13, 14, p. 164.

Members of this subgenus are very similar to the species of *Asaphellus*, but the facial sutures are of different types in the two. *Hemigyraspis* is similar to *Niobe*, but the glabella is not defined by dorsal furrows as in that genus, there is no neck-ring, there are spines at the genal angles, and the pygidium is nearly smooth.

Beside the type species, *Ogygia desiderata* Barrande, *Niobe menapiensis* Hicks, and *N. solvensis* Hicks, all of which have been referred to *Asaphellus* by Brogger, and *Asaphellus? planus* Mathew appear to belong to this subgenus.

Hemigyraspis collieana sp. nov.

Plate XIV, figures 9–13.

Asaphus marginalis COLLIE, Bulletin Geological Society of America, XIV, 1903, 413. (In faunal lists.) Not of Hall.

In the section at Bellefonte, Center County, Pennsylvania, Professor Collie found a zone 937 feet above the base of the exposed Beekmantown, and 3,866 feet below the top of that formation, in which an Asaphid was very abundant. The trilobite was supposed to be *Asaphus marginalis* Hall, a species which was very imperfectly known at that time. Professor Collie very kindly gave the writer a number of specimens of this trilobite, and among them I find a small unforked hypostoma, showing that this species can not be referred to the same genus as *Asaphus marginalis* (*Basilicus*).

DESCRIPTION.

Cephalon short and wide, glabella smooth, not outlined, no glabellar furrows. Neck-furrow shallow, hardly visible. Eyes nearly halfway to the front of the cephalon, large, very far apart. Between the eyes is a small median tubercle. Free cheeks short, wide, with long narrow spines at the genal angles. The anterior limb of the facial suture meets the frontal margin in front of the eye. There is a narrow depressed border on the front of the cranidium.

Axial lobe of thorax one-third the total width; pleura grooved. Pygidium short, wide, semicircular in outline. Axial lobe narrow, rather prominent, showing traces of two or three rings. Pleural lobes convex, without traces of ribs. Border narrow, concave; doublure narrow, convex. Hypostoma quadrangular, widest in front, central portion convex, with a furrow and narrow border around the sides and posterior end. Surface of all parts, including the hypostoma, covered with imbricating striæ.

One pygidium is 9.5 mm. long and 18 mm. wide; a larger one is 14 mm. long and 28 mm. wide.

This species differs from the only other American species of the subgenus now known (*Asaphellus? planus* Matthew)[2] in having a more prominent axial lobe on the pygidium, and in having the median tubercle between the eyes instead of back of them. The genal spines are also longer and more rounded in section.

This species is also much like *Asaphellus gyracanthus*, but beside the difference in the course of the facial suture, the cephalon of the species here described is shorter and wider, the eyes are farther apart, and the axial lobe of the pygidium is much more prominent.

Locality.—This species is described from specimens from a layer 3,866 feet below the top of the Beekmantown at Bellefonte, Center County, Pennyslvania. It is named for Professor George L. Collie, Dean of Beloit College, who collected the specimens. Cotypes in the Carnegie Museum.

Symphysurus convexus (Cleland).

Plate XIV, figures 14–16.

Asaphus convexus CLELAND, Bulletin American Paleontology, III, 1900, 128, pl 16, fig. 4.

Bathyurus sp. CLELAND, Ibidem, 1900, pl. 16, fig. 9.

Illænurus columbiana WELLER, Paleontology of New Jersey, III, 1902, 133, pl. 5, figs. 1–4.

Bathyurus? levis CLELAND, Bulletin American Paleontology, IV, 1903, 36, pl. 2, figs. 1, 2.

This species was first described from a pygidium obtained by Cleland in the Beekmantown at Fort Hunter, New York. Later Weller obtained specimens from the same horizon at Columbia, New Jersey, and referred the species to *Illænurus*. In this genus Cleland's name was preoccupied, and therefore Weller was forced to give a new name.

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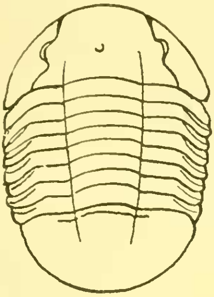
[2] *Bulletin Natural History Society New Brunswick*, IV, 1902, 413, pl. 18, fig. 11

The genus *Illænurus* was proposed by Hall[3] for a trilobite found near the middle of the Potsdam sandstone near Osceola Mills, Wisconsin. This genus appears to be closely related to *Symphysurus*, as Brogger has already suggested ("Euloma-Niobe Fauna," p. 72). There is, however, a real difference between the two genera, for *Symphysurus* has a narrow axial lobe in the thorax, and a pygidium nearly as long as wide, with a distinct axial lobe. In *Illænurus* the axial lobe of the thorax is very wide, as in *Nileus*, the pygidium is twice as wide as long, and has no trace of an axial lobe.



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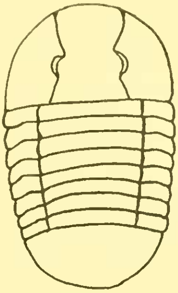

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Fig. 8. *Symphysurus sicardi* (Bergeron). Outline of a specimen in the Carnegie Museum.

Fig. 9. *Illænurus quadratus* Hall. Outline restored from the various parts figured by Hall. The axial lobe of anterior thoracic segments has been made a little too wide.

The pygidium of the species described by Cleland and Weller is nearly as long as wide and has a distinct axial lobe, thus agreeing with *Symphysurus* rather than *Illænurus*. The thorax of this species is not known, but it is highly probable that the axial lobe is narrow, as it is in all trilobites whose pygidia have narrow axial lobes. It will be noticed that the glabella in *Hemigyraspis* and *Asaphellus* is broad, but the axial lobe on the pygidium is narrow, as is the axial lobe of the thorax also. In *Isotelus*, *Nileus*, and *Illænurus quadratus*, where the axial lobe of the thorax is very broad, there is almost no trace of an axial lobe on the pygidium.

Symphysurus convexus is very similar to *Symphysurus angustatus* Sars and Boeck[4] of Norway and to *S. sicardi* (Bergeron) of southern France. A figure of the latter species, drawn from a specimen in the Carnegie Museum, is introduced for comparison. The dorsal furrows are more prominent on the cephalon of the European species, but otherwise they are very much alike.

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[3] *16th Report New York State Cabinet Natural History*, 1863, 176, pl. 7.

Through the kindness of Mr. Henry B. Kummel, State Geologist of New Jersey, the writer has been able to study the fine cranidium figured by Dr. Weller, and to compare it with material from Fort Hunter The specimens from the two localities are alike in all particulars except size, and the specimen from New Jersey shows the small median tubercle between the eyes described by Cleland in specimens from New York.

Illænurus eurekensis Walcott from the lower portion of the Pogonip group[5] should also be referred to *Symphysurus*, as Brogger has already suggested.

Illænurus convexus Whitfield[6] has a pygidium much more like that of the typical *Illænurus* than either of the above species. The pygidium is described by Whitfield as being twice as broad as long and the dorsal furrows indicated only by slight constrictions on the anterior margin. This is probably a true *Illænurus*, though the cranidum is more like that of the species here discussed than it is like that of *Illænurus quadratus*.

Asaphus illænoides Billings (Paleozoic Fossils of Canada, Vol. I, p. 414) is another American species of *Symphysurus*.

All specimens with the exception of the originals of figs. 5, 6, and 14 are in the Carnegie Museum.

EXPLANATION OF PLATE XIV.

1. *Isoteloides whitfieldi* Raymond. A small specimen from the Beekmantown at Crown Point, New York. Natural size. This figure does not show the flattened anterior margin as well as figure 2. Natural size.

2. The same specimen. A little less than natural size.

3. The same species. A pygidium from Fort Cassin, Vermont.

4. The same species. An hypostoma from Ft. Ticonderoga, New York. Natural size.

5. *Asaphellus gyracanthus* Raymond. An imperfect cranidium from Fort Hunter, New York. Natural size. Specimen in the Cornell University Museum.

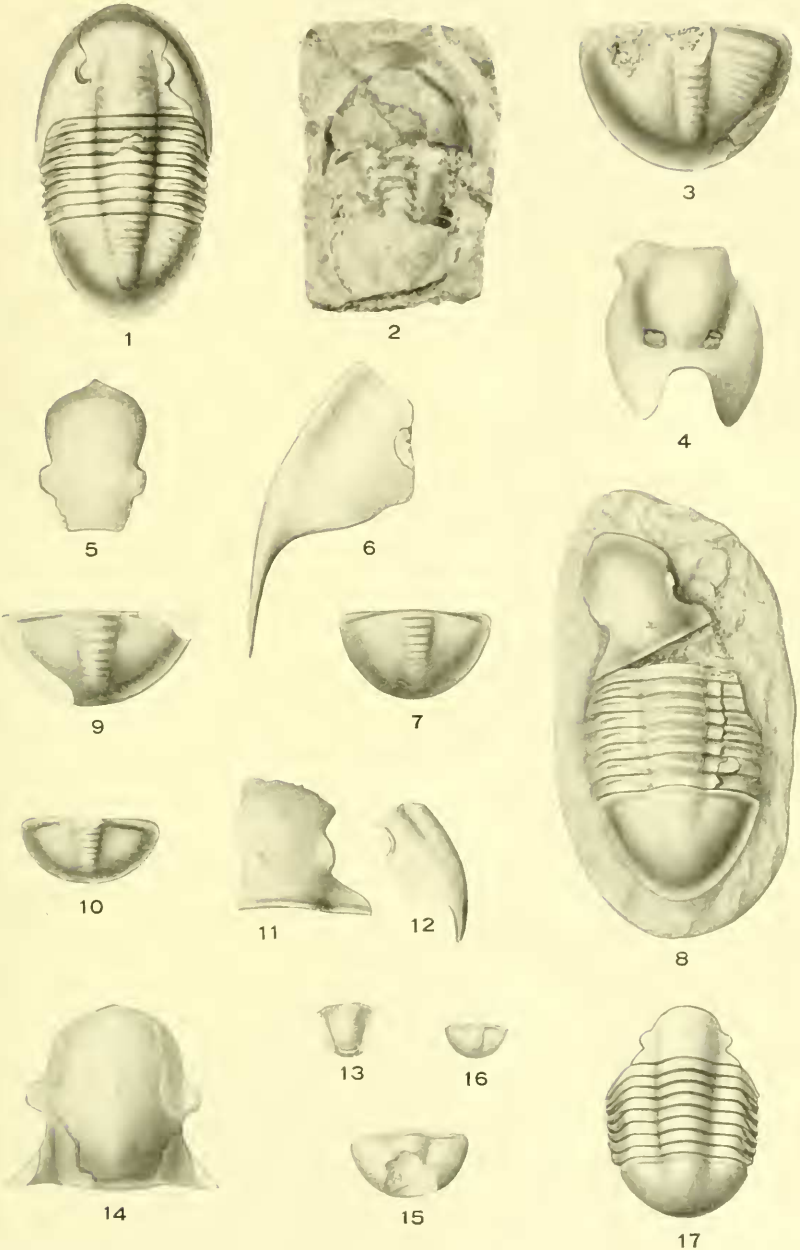
6. The same species. A free cheek from the same locality and same collection as the last. Natural size.

7. The same species. A pygidium from Fort Hunter in the Carnegie Museum. Natural size.

[4] Brogger, "Die Silurischen Etagen 2 und 3," 1882, 60, pl. 3, figs. 9–11

[5] *Paleontology of the Eureka District*, 97, pl. 12, figs, 4. 4a.

[6] *Geology Wisconsin*, IV, 203. pl. 4. figs 3–5



Sydney Prentice, del.

Beekmantown Trilobites.